

September 2007

# THE STUY PULSE

The Press Packet Edition



## Building the Robot Part VII



# STUYPULSE, TEAM 694

ANOTHER YEAR AS A NEW YORK CITY FINALIST



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# Reaching Out to Our Community

By Elizabeth Soukup

In addition to demonstrating robots and engineering skill at multiple competitions, our team spent much of 2006 and 2007 traveling throughout New York, teaching others about our team and FIRST. Our initial event was a mock competition held in early September in the Javits Center that modeled last year's "Aim High" challenge as one of the exhibits during the annual NEXTFest expo. The recently retired Joshua participated in 2-on-2 matches in front of the technologically inclined crowd, demonstrating what FIRST, and the team, were all about. Shortly afterwards, Joshua was introduced to Class of 1956 Stuyvesant alumni during their fifty-year reunion, where the two generations conferred about school, robotics, and just how much the world of engineering has changed in the past half-century.

Team 694 didn't stop with just off-season events, however, as we presented 2005's robot Yvette to Stuyvesant's incoming class of 2011 in the midst of our six-week build season. Mere hours later, Joshua, accompanied by a squad of VEX robots, was packed up and sent to Chelsea Piers to strut his stuff at a Goldman Sachs bowl-a-thon. Employees of the investment bank firm drove the team's robots around the center, while team members explained how FIRST competitions worked, and of course, what made Joshua tick. At the end of the event, which raised money for non-profit organizations, funds were awarded to the participating groups, including a sizeable check made out to FIRST.

Shortly after competing in New York with Tom, the team sent out its female engineers to a "Trendsetters: Women in Engineering" conference. Representing FIRST's female members, team members explained the importance of studying the sciences throughout school and applying for related jobs in those normally male-dominated fields to a large crowd of young women in a panel discussion, mentioning the role of the

organization in fostering the minds of teen-aged engineers. Perhaps the farthest-reaching outreach event of the year occurred during a day-long presentation at the TriBeCa Film Festival. The event, which draws hundreds of thousands of people to lower Manhattan every Spring, served as a showcase for many of team 694's past robots, including Tom, Yvette, Larry, and Joshua, who continued a long string of public appearances by performing on one of the stages set up near the team's booth.



Nearing the end of the 2007 school year, the team set up a demonstration for the Stuyvesant PA association in an attempt to give them a better understanding of what FIRST does. Many of the team's older robots were displayed, as well as the numerous awards the team has accumulated over the years, as team members shared their robotics experiences with the crowd. A few weeks after this penultimate presentation, the team headed down to the Goldman Sachs office building to attend a "Birds of a Feather" technology seminar. Team members listened to lectures alongside the employees, who returned to one of the break rooms where the team had set up a few VEX robots ready for test drives. Through their numerous and varied efforts, the members of team 694 proved that outreach never takes a break.

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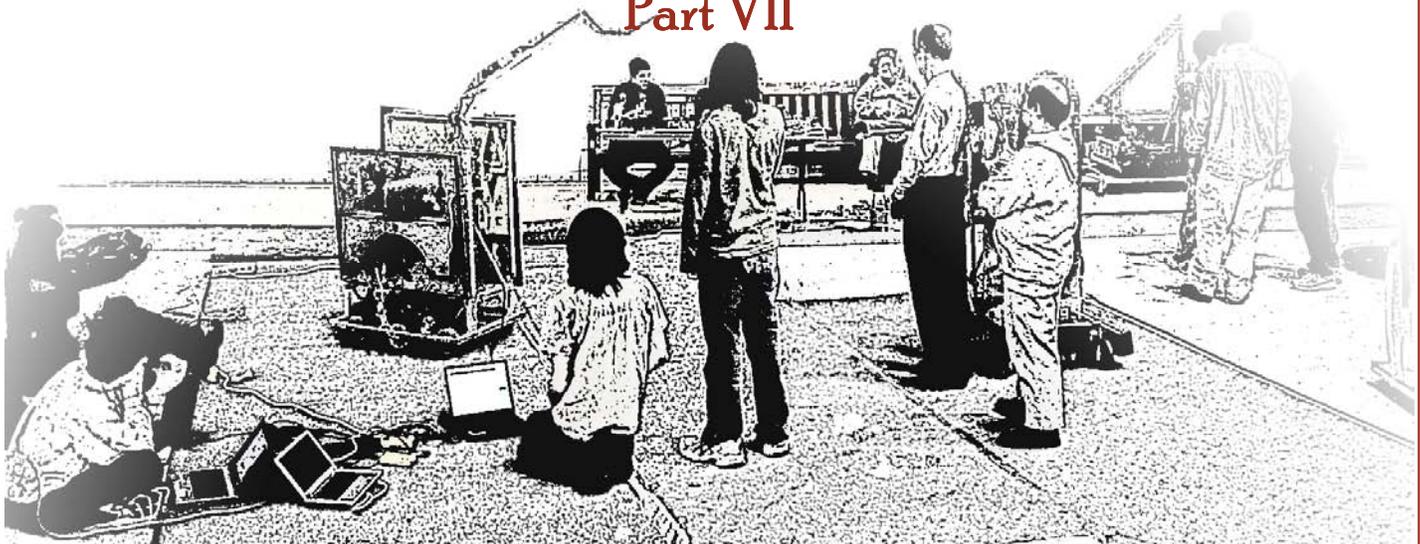
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# Building the Robot

## Part VII



This year, Team 694 started the season early, getting a head start on both fundraising and outreach at an alumni reunion and at NEXTFEST in the Javits Center, where we represented FIRST in a demonstration of the 2006 game, “Aim High.” As it worked out, we would return to the Javits Center only a couple of months later to participate in the New York Regional of this year’s “Rack n’ Roll” game. After coming incredibly close to victory the previous year, we were determined to blow this year’s competition away with a strong drivetrain, an inventive grabber, and two durable ramps that would allow us to rack up bonus points during the endgame.

One of the strongest features of this year’s robot, Tom, was its six-wheeled drivetrain. This was the first year we decided to use DeWalt drill motors to power our wheels, which served us extremely well throughout all three of our competitions. In addition to giving us a steady base upon which we could build the rest of our robot, the drills were connected to servos, allowing us the versatility to switch gears at any point in the match. We ably defended our teammates throughout thirty-odd matches, needing to mke mi-

nor reparations on our drivetrain only once throughout the fierce competitions.

Though our drivetrain might have been the most powerful component of



this year’s robot, perhaps the most durable and noticeable were the two ramps attached to the wider sides of the chassis. In order to score up to sixty valuable

points in the endgame of this year’s competition, one robot could elevate its alliance partners one foot or higher off of the ground during the last sixty seconds of the match. Team 694 achieved this feat by creating a “parking lot” of sorts in our home zone, deploying one section parallel to the ground at a height of thirteen inches and another, segmented ramp with a gentle slope (to better enable robots to drive on top of us). This provided us with ample room for robots of even the maximum dimensions to be elevated one foot in the air.

Our robot’s arm and grabber comprise the most diverse and change-prone parts. The grabber went through many iterations, some of which are detailed on this page.

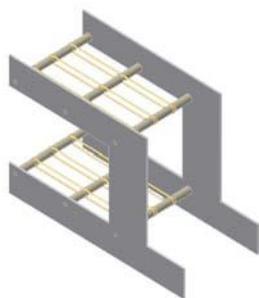
This was certainly a hectic year for Team 694 as we built, designed, engineered, and worked from the moment the game challenge was announced in January up to the very last hours of the Championship competition.

Though we are pleased with our numerous accomplishments, we are not yet satisfied and plan to use the vast body of knowledge we’ve gained this year to produce an even better robot next year

# the Grabbers



The original design was comprised of an actuated hook attached to the end of a rotating arm. The hook would start flat, and could then slide under the tube. A motor would then pull on a string which would, in turn, lift a flap of plastic, holding the tube in place. The arm could then rotate to whatever height was required to place the tube on the rack.

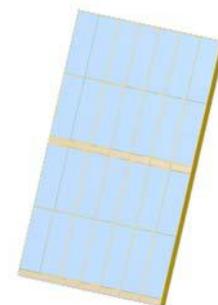


Two of the new grabber designs used a motorized set of rubber hoses to pull the tube into a set of jaws. The motors could be reversed to expel the tube. Unfortunately, both versions were too heavy to lift for the motor which rotated the arm.



The fourth design was made between the two competitions used a small PVC hook actuated by a pneumatic cylinder to clamp down on the tube. Since we could not add this pump system to the robot, this was unusable.

# the Ramps



The first ramp design used a grid of fiberglass filled with foam insulation. This assembly was then wrapped in fiberglass fabric to hold it together and ensure a uniform surface. However, this design proved too heavy to be lifted.

The second design consisted of foam blocks sandwiched between two sheets of fiberglass. This idea was promising, but also turned out to be too heavy to lift once robots were driven onto the ramps. At this point, the concept of lifting the ramps was abandoned, and the robot was partially redesigned to allow for stationary ramps.



The final design utilized aluminum honeycomb, which is usually found in aircraft flooring. This light and durable material proved to be exactly what we needed, as it withstood the weight of other robots while freeing up some much-needed weight.

# The Lab Gets a New Makeover

By Steven Lam

Each year, Team 694 ends with “cleanup” day. This usually means sorting through all the bolts, tools and useless junk that can accumulate throughout the lab; perhaps not the most enticing of tasks. However, we went for an even more ambitious goal this year: a full-scale lab redo. The team was getting larger and we were going to need more space to accommodate all of us in the next year.

## Lathe

The previous year, our small, non-CNC, lathe broke down and we decided to purchase a bigger and better one. After scouring around, we found a LeBlonde lathe for sale. Finding However, the real problem came in having it delivered to Stuy. A typical LeBlonde lathe can easily weigh around 3,500 lbs and could not be considered something easily transportable. We needed a large trailer truck to deliver the lathe to us, then, a forklift to carry the behemoth to our floor. By knocking down a few columns and moving around some tables, we were finally able to place the lathe in its cozy new nook.

## Mill

After having spent more money to ship the lathe than to purchase it, we decided to get the most use out of the forklift as possible. We brought up the old mill that was sitting unused in the third floor woodshop for years. After cleaning it up and having a repairman look over it, it was in perfect working order.

## Cabinets

Every year by mid-season, tools are all over the place. A person could find five calipers in one cabinet, but not a single wrench. Although we have tried numbering the tools, this never works. This year we are trying a completely different setup. All of the old tool holders were taken off and replaced with a pegboard and hooks and every cabinet was set up the same way with tools going into specific spots in each cabinet. We even color-coded the tools to indicate which cabinet each tool should go into.

## Trip To McKee

Team 522 (the RoboWizards) invited us to their lab. We could not help but notice the difference in organization. McKee had all their robots out in full display, which was an amazing feat when compared to all the robots that are forcefully crammed into our closet. There was a whole room filled with lathes and mills nearly the size of our entire workspace. It was amazing to see how large and well equipped their lab was.

It made us think of how we could improve on our own. There are certainly lessons to be learned from emulating their layout.



# The Team Gets a New Pit

By Susan Zheng



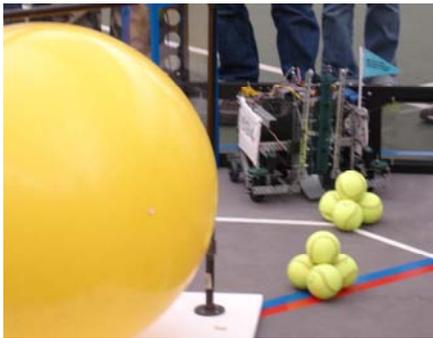
This year, to help make our team stand out off the playing field as well as on, our marketing president, Nathan Keyes, came up with the innovative idea of creating our own pit booth and tool crate.

Our approximately 1000 cubic foot pit booth helped make our team stick out in the pits, making ourselves easily identifiable among the numerous other teams during competition, while also serving as a display during the offseason. Assembly only requires 20 minutes and four people to help lift the assembled parts on top of its base.

The concept behind the tool crate was for it to help keep track of our various tools and materials, while also helping to transport items to and from competition sites. The tool crate is comprised of two hinged halves with one side containing shelves and the other, pegboards. During competition, tools are hung on the pegboard, while coats and bags were stored behind it. When the crate is transported, the pieces of the pit booth are kept behind the pegboard, while the shelves are filled allowing for easy transportation of materials and tools.

## Team 694 Enters FVC

By Daryl Vulis



Although the FIRST VEX Competition challenge was released in September, our team got off to a late start, registering and assembling the team only three weeks before our regional. Despite our late beginnings, eager and willing recruits quickly filled our nine member team and we were off to a hasty start.

The majority of this year's game centered on robots scoring by moving softballs into corner goals or high goals, while points were increased based on control of the "Atlas Ball". Extra points were awarded if robots succeeded in driving onto the central platform or raising themselves on the bar at the end of the match.

Speedily designing a robot, our team initially decided to gear our robot's abilities toward the high goal with an unfold-

ing apparatus which would fit into starting dimensions and unfold to score in the high goals. In addition, the robot would have arms to herd softballs into corner goals. Unfortunately this original design proved a failure just the day before competition resulting in a complete redesign and construction overnight by two dedicated members. Our new design played a more passive role as it collected balls and dumped them into the corner goal.

Despite the many difficulties faced by our team throughout the build season and at competition, our team still managed to win two out of four of our matches at the Trenton regional. Although we were not the most impressive robot at competition, our Vex team gained an invaluable amount of technical experience as well as a close-knit team.

### Onward to VISC

Since the close of a hectic build season, our efforts are now directed toward involving even more Stuyvesant H.S. students, in this fun and rewarding program. As a result, VISC (Vex Inter-Stuy Competition) was created. This program is meant as a general introduction to FIRST for students who may not yet want the commitments involved with a full-fledged FIRST team. Instead, VISC is significantly less time consuming and has since recruited several more members to the Vex club. The competition operates by pitting teams of members against each other in a unique challenge.

## Safety!

By Samuel Crisanto

Safety is of utmost importance, and needs to be considered in any undertaking, particularly one as dangerous as robotics. Considering all the hazards that are involved in the construction of a functional robot: the cutting, milling, sawing, hammering, testing, retesting, drilling, and all the myriad of odd sharp edges and random accidents that must be watched out for, ensuring the safety of everyone involved is a laborious task requiring a great deal of knowledge and an even greater deal of caution.

These risks, however, can be greatly diminished if a number of rather simple steps are taken. The first thing that all robotics team members must do is pass a safety exam, in which they demonstrate that they possess the basic knowledge required to even be inside the lab. All new members must go through a training period in which they are familiarized with the concepts of robotics, the use of the tools involved, and the proper procedures to follow in the event of an emergency.

Perhaps most extraordinary, however, are the preventative measures that we undertook in the event a team member were to become in some way incapacitated. A number of members on the team, involved in all aspects of the robot's construction, underwent CPR and First Aid/AED training to ensure that if the unthinkable were to occur, help would be close at hand.

Our team's stringent adherence to the guidelines put forth, coupled with foresight and the implementation of a few good ideas, helped us to win the safety award in New York. The most important aspect of the safety of our team, however, was communication. Keeping everyone aware of any possible hazards at any given time is a huge step in the prevention of accidental injury, and this should always be kept in mind before undertaking any potentially dangerous action. Keep your teammates informed, and accidents will be kept to a minimum. Remember – **safety first!**

## Candy

By Allan Dong



cumulative profit of  
**\$12,500** made by over  
**70** participants selling  
**23,000** pieces of candy in  
**69** days at an average of about  
**\$180** made each day

This year, Mr. Colón challenged us to raise the money for our registration fee if we wanted to go to the Championships in Atlanta. We decided to do this by selling candy to our schoolmates over a period of three months. Thanks to a tremendous

effort by dedicated members and their parents, we were able to meet our goal within two months. The resulting surplus allowed many members to travel to a competition for free or at a reduced price.

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Stuyvesant Alumni Association

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Goddard Riverside Community Center

Cox and Company, Inc.

## Supporting Our Team

We seek mentors who are specialist or hobbyist in engineering design, machine operation, programming or marketing and who wish to work with highly motivated students

We also seek donations. A FIRST team spends thousands of dollars each year for registration fees, a basic kit of parts, additional building material, robot transportation, administrative expenses and more.

Students and parents work hard to support the team through book sales and similar fundraising efforts, but more help is needed. We invite you to partner with us in the amazing educational endeavor

### \$10-\$99

- Contributor's website linked on sponsors page of team's website

### \$100-\$499

- Contributor listed on robot and shipping crate

### \$500-\$1999

- Contributor listed on team T-shirts

### \$2000-\$4999

- Contributor decal placed on robot
- Contributor logo displayed on team banner
- Contributor listed in competition program

### \$5000-\$9999

- Contributor listed in enlarged font on T-shirts
- Contributor logo is link placed below team website navigation bar on every page

### \$10000+

- Contributor logo placed at top of team banner

### Highest Overall Contributor

- Contributor chooses robot name

Thank You

Tom Ferguson

&

Vladmir Shpigel



Special thanks goes to Tom Ferguson and Vladmir Shpigel for allowing the team to use their facilities. Without access to the machinery and expertise of Cox and Company and One-CanDo, this year would not have been nearly as successful as it was. In the absence of Mr. Colón, these two mentors went beyond the call of duty to help us. The team is grateful for their numerous contributions.